

Comission Test Report**Report No.: SZES201000668801****Date: 2020-12-17**

Applicant: Shenzhen BAK Technology Co., Ltd.
No.2216, Tianan Cyber Times Town, Tianan Cyber Park, Chegongmian, Futian
Shenzhen, Guangdong, China

Manufacturer: Same as applicant

Factory: DongGuan ZeYuan Energy Co., Ltd.
201, Building B, Guanghui High-tech Industrial Park, No. 18, Longjiang Road,
Xiekeng Village, Qingxi, Dongguan, Guangdong, China

Test object / Model: Rechargeable Li-ion Battery / RT410/T10

Test specifications / Test standard: Test refer to IEEE standard for Rechargeable Batteries for cellular Telephones-
IEEE Std 1725-2011
CTIA Certification Requirements for Battery System Compliance to IEEE 1725
CRD Revision 2.11, section:
4.18 Overcurrent Protection Device
5.2 Part Number
5.3 Voltage
5.4 Chemistry
5.5 Pack Vendor Identification
5.11 Limit Output Current
5.14 Thermal Sensor Design
5.22 Pack Overcurrent Protection Requirement
5.23 External Mechanical Force
5.28 ESD
5.48 Pack Drop Test

Test result: See the below pages for detail.

Remark: Test results reported relate only to the items being tested.
This test report was issued base on CTIA Project Number: LPRR092336.

Jerry Xiao
Project Reviewer
Safety Laboratory

Sunny Guan
Project Engineer



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Shenzhen Branch Safety Laboratory

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1. General product description:

Item	Information	Comments
Product Description	Li-ion Battery	--
Model No.	RT410/T10	--
Rated Capacity	3000 mAh	--
Rated Voltage	3.8 V	--
Max. Charge Voltage	4.35 V	--
End of Discharge Voltage	3.0 V	--
Standard Charge Current	600 mA	--
Standard Discharge Current	600 mA	--
Max. Charge Current	0°C ~15°C: 600 mA 15°C ~55°C: 1500 mA	--
Max. Discharge Current	-20°C~0°C:600 mA 15°C~45°C:3000 mA 0°C~15°C and 45°C~60°C: 1500 mA	--
Charge Operation Temperature	0-55 °C	--
Discharge Operation Temperature	-20-60 °C	--
Cell Model No.	V635061P	--
Cell Manufacturer	Zhengzhou BAK Electronics Co., Ltd.	--

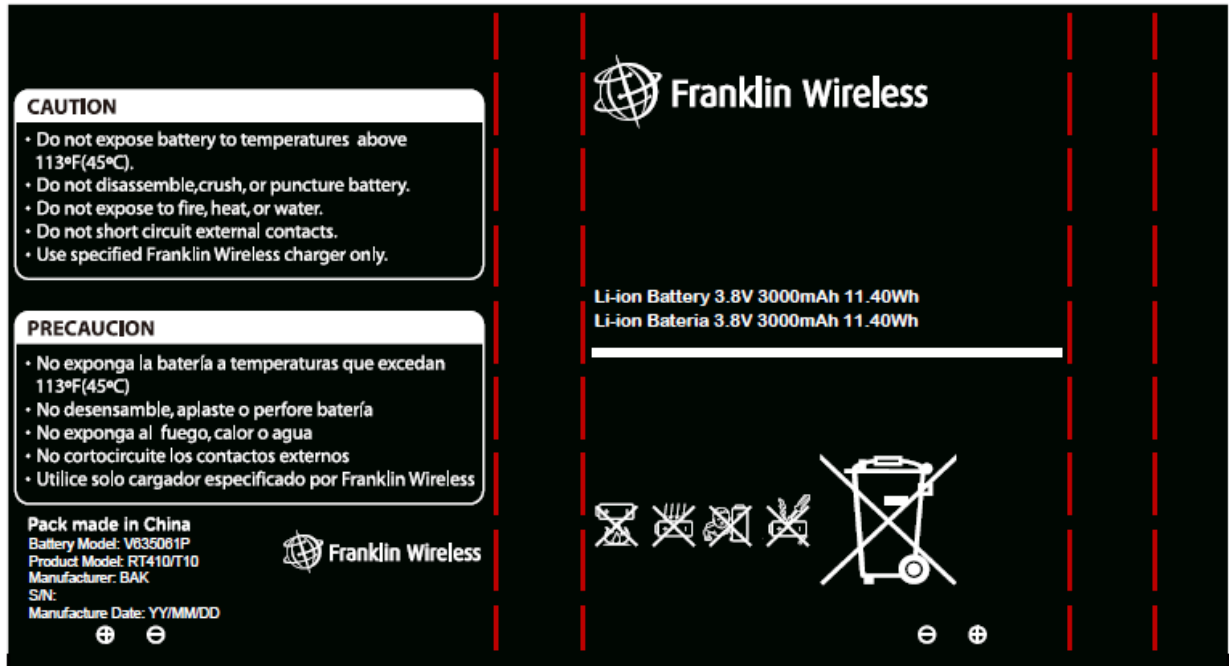


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2. Marking



Remark: S/N number included manufactured date.

For example: S/N: 200901000001, '20'-2020, take the last two digits of the year. '09'- Sep., month of the year, '01'- the first day of the month. '000001'-serial number.



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3. Test description:

Possible test case verdicts:

- test case does not apply to the test object: N/A (Not Applicable)
- test object does meet the requirement: P (Pass)
- test object does not meet the requirement: F (Fail)

The tests were done in the Electrical Safety Laboratory of SGS-CSTC in Shenzhen.

Test item was received on 2020-11-19

Tests were performed from 2020-11-19 to 2020-12-09.

Ambient temperature: 20±5°C

Relative humidity: 55±20%RH (30~60%RH for CRD section 5.28)

Throughout this report a point is used as the decimal separator.

4. Sample Size:

CRD Section	Samples Size
4.18 Overcurrent Protection Device	1
5.2 Part Number	5
5.3 Voltage	Use samples from 5.2
5.4 Chemistry	Use samples from 5.2
5.5 Pack Vendor Identification	Use samples from 5.2
5.11 Limit Output Current	Use samples from 5.2
5.14 Thermal Sensor Design	5
5.22 Pack Overcurrent Protection Requirement	5
5.23 External Mechanical Force	3
5.28 ESD	5
5.48 Pack Drop Test	5



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5. Test Requirement:

CRD Section 4.18 Overcurrent Protection Device

Test Method/ Specification:

4.18 Overcurrent Protection Device	
Reference:	IEEE 1725, Section 5.2.7
Purpose:	To confirm that cells qualified with ancillary protective measures are employed at the pack level with such measures intact.
Procedure:	Review cell specifications to determine if component cell was qualified with a PTC or other protective device. Review current construction of 1 sample to see if same device is in evidence in pack construction.
Compliance:	If the cell design was qualified with a PTC or other protective device, this protective device is present in the battery pack.

Test Result:

Model No./ Sample No.	Check Item	Is PTC or other protective device present in the battery pack?	Result
RT410/T10 / (#1)		No	Pass



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CRD Section 5.2 Part Number

Test Method/ Specification:

5.2 Part Number	
Reference:	IEEE 1725, Section 6.2.2.1
Purpose:	Ensure part number is identified on battery pack.
Procedure:	Visually inspect battery pack.
Compliance:	Part number is identified and correct.

Test Result:

Model No./ Sample No.	Check Item	Part Number	Is part number identified and correct?	Result
RT410/T10 / (#2)		200926000851	YES	PASS
RT410/T10 / (#3)		200926000852	YES	PASS
RT410/T10 / (#4)		200926000853	YES	PASS
RT410/T10 / (#5)		200926000854	YES	PASS
RT410/T10 / (#6)		200926000855	YES	PASS



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CRD Section 5.3 Voltage
Test Method/ Specification:

5.3 Voltage	
Reference:	IEEE 1725, Section 6.2.2.2
Purpose:	Ensure typical voltage of pack is identified on battery pack.
Procedure:	Visually inspect battery pack.
Compliance:	Typical voltage is identified and correct on battery pack. Embedded batteries are exempt from this requirement.

Test Result:

Model No./ Sample No.	Check Item	Typical voltage	Is typical voltage identified and correct on battery pack?	Result
RT410/T10 / (#2)		3.8 V	YES	Pass
RT410/T10 / (#3)		3.8 V	YES	Pass
RT410/T10 / (#4)		3.8 V	YES	Pass
RT410/T10 / (#5)		3.8 V	YES	Pass
RT410/T10 / (#6)		3.8 V	YES	Pass



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CRD Section 5.4 Chemistry

Test Method/ Specification:

5.4 Chemistry	
Reference:	IEEE 1725, Section 6.2.2.3
Purpose:	Ensure chemistry of battery pack.
Procedure:	Visually inspect battery pack.
Compliance:	Chemistry type is identified and correct on battery pack. Embedded batteries are exempt from this requirement.

Test Result:

Model No./ Sample No.	Check Item	Chemistry type	Is chemistry type identified and correct on battery pack?	Result
RT410/T10 / (#2)		Li-ion Battery	YES	Pass
RT410/T10 / (#3)		Li-ion Battery	YES	Pass
RT410/T10 / (#4)		Li-ion Battery	YES	Pass
RT410/T10 / (#5)		Li-ion Battery	YES	Pass
RT410/T10 / (#6)		Li-ion Battery	YES	Pass



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CRD Section 5.5 Pack Vendor Identification

Test Method/ Specification:

5.5 Pack Vendor Identification	
Reference:	IEEE 1725, Section 6.2.2.4
Purpose:	Ensure Pack Vendor identified properly.
Procedure:	Visually inspect battery pack.
Compliance:	Pack Vendor is identified and correct on battery pack.

Test Result:

Check Item Model No./ Sample No.	Pack Vendor	Is pack vendor identified and correct on battery pack?	Result
RT410/T10 / (#2)	BAK	YES	Pass
RT410/T10 / (#3)	BAK	YES	Pass
RT410/T10 / (#4)	BAK	YES	Pass
RT410/T10 / (#5)	BAK	YES	Pass
RT410/T10 / (#6)	BAK	YES	Pass



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CRD Section 5.11 Limit Output Current

Test Method/ Specification:

5.11 Limit Output Current	
Reference:	IEEE 1725, Section 6.4.1
Purpose:	Validate performance of battery pack short circuit protection.
Procedure:	Before the test, the battery pack shall be fully charged according to Table A.2—Brief description of battery pack electrical tests of IEEE1725, or according to the vendor's specifications. Perform short circuit tests with a resistance of 80 +/- 20 milliohms at minimum and maximum operating temperatures for 1 hour.
Compliance:	The battery pack has short circuit protection and limits the discharge current. All safety features shall remain operational, or the pack shall be permanently disabled. No fire, smoke, or explosions occurs.

Test Result:

Test Item Model No./ Sample No.	Operating Temperature (°C)	No fire, smoke, or explosions occur?	Result
RT410/T10 / (#2)	60	YES	Pass
RT410/T10 / (#3)		YES	Pass
RT410/T10 / (#4)		YES	Pass
RT410/T10 / (#5)	-20	YES	Pass
RT410/T10 / (#6)		YES	Pass



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CRD Section 5.14 Thermal Sensor Design

Test Method/ Specification:

5.14 Thermal Sensor Design	
Reference:	IEEE 1725, Section 6.5.2
Purpose:	Validate that a thermal sensor either in the battery pack and/or host monitors cell temperature and enables the system to limit operation within the cell's thermal specifications.
Procedure:	Place the device(s) that contain(s) the thermal sensor in an environmental chamber and monitor the output of the thermal sensor over the operating temperature range of the cell. Do not charge or discharge the pack during this test.
Compliance:	Verify the output of the thermal sensor meets its specification over the operating temperature range of the cell.

Test Result:

Test Item Model No./ Sample No.	Cell Temperature (°C)	Thermistor Resistance (KΩ)		Thermistor adequately represents the temperature of the cell?	Result
		Specification	Measured		
RT410/T10 / (#7)	60	2.85-3.15	3.134	YES	Pass
	55	3.3345~3.6855	3.611		
	50	3.9235~4.3365	4.225		
	45	4.636~5.124	4.962		
	40	5.51~6.09	5.712		
	35	6.574~7.266	6.775		
	30	7.885~8.715	8.184		
	25	9.5~10.5	10.077		
	20	11.514~12.726	12.021		
	15	14.041~15.519	14.626		
	10	17.2235~19.0365	17.808		
	5	21.2515~23.4885	21.667		
	0	26.41~29.19	27.109		
	-5	33.0315~36.5085	35.334		
	-10	41.6195~46.0005	44.613		
-15	52.839~58.401	55.459			



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	-20	67.621~74.739	71.968		
RT410/T10#8)	60	2.85-3.15	3.098	YES	Pass
	55	3.3345~3.6855	3.425		
	50	3.9235~4.3365	4.057		
	45	4.636~5.124	4.748		
	40	5.51~6.09	5.901		
	35	6.574~7.266	6.885		
	30	7.885~8.715	8.259		
	25	9.5~10.5	10.025		
	20	11.514~12.726	11.995		
	15	14.041~15.519	14.802		
	10	17.2235~19.0365	18.008		
	5	21.2515~23.4885	22.667		
	0	26.41~29.19	27.509		
	-5	33.0315~36.5085	34.334		
	-10	41.6195~46.0005	43.613		
-15	52.839~58.401	55.699			
-20	67.621~74.739	71.635			
RT410/T10 / (#9)	60	2.85-3.15	2.992	YES	Pass
	55	3.3345~3.6855	3.412		
	50	3.9235~4.3365	4.014		
	45	4.636~5.124	4.902		
	40	5.51~6.09	5.901		
	35	6.574~7.266	6.841		
	30	7.885~8.715	8.251		
	25	9.5~10.5	10.0325		
	20	11.514~12.726	12.114		
	15	14.041~15.519	14.859		
	10	17.2235~19.0365	18.503		
	5	21.2515~23.4885	22.854		



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Comission Test Report

Report No.: SZES201000668801

Date: 2020-12-17

	0	26.41~29.19	27.874		
	-5	33.0315~36.5085	34.369		
	-10	41.6195~46.0005	43.952		
	-15	52.839~58.401	55.215		
	-20	67.621~74.739	71.248		
RT410/T10 / (#10)	60	2.85-3.15	3.034	YES	Pass
	55	3.3345~3.6855	3.511		
	50	3.9235~4.3365	4.125		
	45	4.636~5.124	4.861		
	40	5.51~6.09	5.814		
	35	6.574~7.266	6.807		
	30	7.885~8.715	8.254		
	25	9.5~10.5	10.025		
	20	11.514~12.726	12.098		
	15	14.041~15.519	14.811		
	10	17.2235~19.0365	17.995		
	5	21.2515~23.4885	21.998		
	0	26.41~29.19	27.741		
	-5	33.0315~36.5085	34.658		
	-10	41.6195~46.0005	43.852		
-15	52.839~58.401	55.782			
-20	67.621~74.739	71.924			
RT410/T10 / (#11)	60	2.85-3.15	3.134	YES	Pass
	55	3.3345~3.6855	3.611		
	50	3.9235~4.3365	4.225		
	45	4.636~5.124	4.962		
	40	5.51~6.09	5.712		
	35	6.574~7.266	6.775		
	30	7.885~8.715	8.184		
	25	9.5~10.5	10.077		



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	20	11.514~12.726	12.021		
	15	14.041~15.519	14.626		
	10	17.2235~19.0365	18.808		
	5	21.2515~23.4885	22.667		
	0	26.41~29.19	27.109		
	-5	33.0315~36.5085	34.334		
	-10	41.6195~46.0005	43.741		
	-15	52.839~58.401	55.589		
	-20	67.621~74.739	71.324		



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CRD Section 5.22 Pack Overcurrent Protection Requirement

Test Method/ Specification:

5.22 Pack Overcurrent Protection Requirement	
Reference:	IEEE 1725, Section 6.8.2
Purpose:	Validate performance of pack discharge overcurrent protection.
Procedure:	Subject the pack to a load in excess of discharge overcurrent protection identified in IEEE 1725 6.8.1 at the minimum operating temperature, ambient temperature, and maximum operating temperature.
Compliance:	Operation of pack/cell overcurrent protection is within specified time and current over the temperatures tested.

Test Result:

Test Item Model No./ Sample No.	Operating Temperature (°C)	Overcurrent protection action time (ms)	Overcurrent protection work within: 9-30 ms if discharge current over 5-8 A?	Result
R410/T10 / (#12)	-20	29.6	YES	Pass
	25	11.4	YES	
	60	9.4	YES	
R410/T10 / (#13)	-20	26.4	YES	Pass
	25	12.4	YES	
	60	10.5	YES	
R410/T10 / (#14)	-20	25.2	YES	Pass
	25	12.4	YES	
	60	9.2	YES	
R410/T10 / (#15)	-20	25.2	YES	Pass
	25	11.5	YES	
	60	9.3	YES	
R410/T10 / (#16)	-20	28.2	YES	Pass
	25	11.2	YES	
	60	9.4	YES	



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CRD Section 5.23 External Mechanical Force

Test Method/ Specification:

5.23 External Mechanical Force									
Reference:	IEEE 1725, Section 6.9.9, UL 2054								
Purpose:	Validate mechanical robustness for purpose of use.								
Procedure:	If the battery pack is non-embedded, perform the Steady Force test per UL 2054 on 3 samples of the battery pack. If the pack is embedded, the test may optionally be performed on the host device with the battery pack installed.								
Compliance:	Per UL 2054.								
250 N Steady Force Test									
Reference:	UL 2054 Paragraph 19								
Procedure:	The batteries are to be tested in an ambient temperature of 20 ± 5°C (68 ± 9°F). External enclosures of the battery pack are to be subjected to a steady force of 250 ± 10 N (56 ± 2 pounds force) for a period of 5 seconds, applied in turn to the top, bottom and sides of the battery pack enclosure by means of a suitable test tool providing contact over a circular plane surface 30 mm (1.2 inches) in diameter.								
Compliance:	The samples shall not explode or catch fire. The outer battery enclosure shall not crack to the extent that the cells or any protective devices are exposed. The sample shall be examined 6 hours after testing and shall not vent or leak. Unacceptable leakage is deemed to have occurred when the resulting mass loss exceeds the values shown in below Table, Venting and Leakage Mass Loss Criteria.								
<table border="1"> <thead> <tr> <th>Mass of cell or battery</th> <th>Maximum Mass % Loss</th> </tr> </thead> <tbody> <tr> <td>Not more than 1 gram</td> <td>0.5</td> </tr> <tr> <td>More than 1.0 gram but not more than 5.0 gram</td> <td>0.2</td> </tr> <tr> <td>More than 5.0 gram</td> <td>0.1</td> </tr> </tbody> </table>		Mass of cell or battery	Maximum Mass % Loss	Not more than 1 gram	0.5	More than 1.0 gram but not more than 5.0 gram	0.2	More than 5.0 gram	0.1
Mass of cell or battery	Maximum Mass % Loss								
Not more than 1 gram	0.5								
More than 1.0 gram but not more than 5.0 gram	0.2								
More than 5.0 gram	0.1								

Test Result:

Test Item	Weight Measurement (g)				The samples shall not explode or catch fire.	The outer battery enclosure shall not crack to the extent that the cells or any protective devices are exposed.	Result
	Initial(W ₀)	Final(W ₁)	(W ₀ -W ₁)/W ₀	Meet mass loss criteria?			
Model No./ Sample No.	--	--	--	--	--	--	N/A



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CRD Section 5.28 ESD

Test Method/ Specification:

5.28 ESD	
Reference:	IEEE 1725, Section 6.10.3.1
Purpose:	Validate the ability of the pack to withstand ESD.
Procedure:	Subject pack to ESD in accordance with IEC 61000-4-2 per product level 2 at a minimum.
Compliance:	Performance of pack protection circuitry per Section 5.11 of this document after the ESD test. If the pack includes an over voltage protection mechanism that could be susceptible to ESD damage, it shall be verified as functional after the ESD test. All compliance testing shall be done at ambient temperature only.

Following test methods will be cited in this test.

5.11 Limit Output Current	
Reference:	IEEE 1725, Section 6.4.1
Purpose:	Validate performance of battery pack short circuit protection.
Procedure:	Before the test, the battery pack shall be fully charged according to Table A.2—Brief description of battery pack electrical tests of IEEE1725, or according to the vendor's specifications. Perform short circuit tests with a resistance of 80 +/- 20 milliohms at minimum and maximum operating temperatures for 1 hour.
Compliance:	The battery pack has short circuit protection and limits the discharge current. All safety features shall remain operational, or the pack shall be permanently disabled. No fire, smoke, or explosions occurs.

Test Result:

1. ESD Test

Test Item Model No./ Sample No.	Test Voltage (Contact and Air)	No fire, smoke, or explosions occur?	Result
R410/T10 / (#17)	Air Discharge (4 kV)	YES	Pass
R410/T10 / (#18)		YES	Pass
R410/T10 / (#19)		YES	Pass
R410/T10 / (#20)		YES	Pass
R410/T10 / (#21)		YES	Pass



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Comission Test Report

Report No.: SZES201000668801

Date: 2020-12-17

2. Short Circuit Test

Test Item Model No./ Sample No.	Operating Temperature (°C)	No fire, smoke, or explosions occur?	Result
R410/T10 / (#17)	60°C	YES	Pass
R410/T10 / (#18)		YES	Pass
R410/T10 / (#19)		YES	Pass
R410/T10 / (#20)	-20°C	YES	Pass
R410/T10 / (#21)		YES	Pass

3. Battery Pack Safety Circuitry Functionality -- Overvoltage Protection

Test Item Model No./ Sample No.	Overvoltage Protection (V)		Maximum measured charge voltage is not exceed the maximum overvoltage protection specified by battery vendor?	Result
	Specification	Measured		
R410/T10 / (#17)	4.35	4.345	YES	Pass
R410/T10 / (#18)	4.35	4.349	YES	Pass
R410/T10 / (#19)	4.35	4.349	YES	Pass
R410/T10 / (#20)	4.35	4.347	YES	Pass
R410/T10 / (#21)	4.35	4.350	YES	Pass



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CRD Section 5.48 Pack Drop Test

Test Method/ Specification:

5.48 Pack Drop Test	
Reference:	IEEE 1725, Section 6.14.4
Purpose:	Validate the ability of the pack to withstand a drop.
Procedure:	<p>One of the following tests is conducted based on the end use application defined by the pack vendor. If the pack can be used in both applications, the worst case test condition shall be used.</p> <p style="text-align: center;">HEAD LEVEL:</p> <p>Where the normal use of the device is at the head level, 5 packs shall be fully charged according to the vendor's specifications. Packs are rested a maximum of 1 hour. The open circuit voltage is then recorded. Each pack shall then be drop tested from a height of 1.5 meters (5 feet) onto a smooth concrete surface 18 times (three repetitions of six sides). Record the open circuit voltage of the packs within 5 minutes after the 18 drops. Testing shall continue up to 36 times (a total of six repetitions of six sides). Allow packs to rest for at least one hour after the final 18 drops. Record the open circuit voltage of the packs within 1 hour after the final 18 drops.</p> <p>For non-user replaceable packs (embedded batteries), this test shall be conducted on batteries installed in the host device.</p> <p style="text-align: center;">ALL OTHER CASES:</p> <p>For all other devices, 5 fully charged packs shall be subjected to the drop test in accordance to UL 2054.</p>
Compliance:	<p>Based on the test conducted, one of the following applies.</p> <p>After 18 drops, no temporary internal shorts causing a total voltage of the cells or pack decrease of more than 0.010V open circuit voltage, no heating, no smoke, no fire and / or leakage. After 36 drops, no permanent internal shorts causing a voltage decrease to 75% or less of the initial open circuit voltage.</p> <p>The compliance requirement in UL 2054 shall be satisfied.</p>

Test Result:

1. Appearance check of specimen

Model No./ Sample No.	Check Item	No heating, no smoke, no fire and/or leakage?	Result
--		--	N/A



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2. Open Circuit Voltage Measurement (After 18 times Drop Test)

Check Item Model No./ Sample No.	Open Circuit Voltage Measurement (V)			$(V_0 - V_1) < 0,010$ Volt?	Result
	Initial (V ₀)	After 18 times Drop Test (V ₁)	V ₀ -V ₁		
--	--	--	--	--	N/A

3. Open Circuit Voltage Measurement (After 36 times Drop Test)

Check Item Model No./ Sample No.	Open Circuit Voltage Measurement (V)			$(V_2/V_0) > 75\%$?	Result
	Initial (V ₀)	After 36 times Drop Test (V ₂)	V ₂ /V ₀		
--	--	--	--	--	N/A



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Attachment 1 Pack specification

序号 No.	项目 Items	规格 Specification	
1	Normal Voltage 标称电压	3.8V	
2	Nominal Capacity 标称容量	3000mAh	Standard charge & discharge 标准充放电
3	Max Charge Voltage 上限充电电压	4.35V (标准充电方法:恒流/恒压/ Standard Charging Method CC/CV)	
4	Discharge cut-off voltage 放电终止电压	3.0V(limited by PCB)	
7	Max. Charge Current / 最大充电电流	0.5C	15-55°C
8	Max. Discharge Current / 最大放电电流	1.0C	15-45°C
9	Charging environment 充电工作环境	Charge Temperature: 0°C~15°C: 0.2C Max to 4.35V 最大 0.2C 充电至 4.35V 15°C~55°C: 0.5C Max to 4.35V 最大 0.5C 充电至 4.35V	
		充电温度: 0°C~55°C Relative Humidity: 45-85%RH 相对湿度: 45-85%RH	
10	Discharge working environment 放电工作环境	-20°C~0°C: Discharge Current Max. 0.2C 最大放电电流 0.2C 15°C~45°C: Discharge Current Max. 1C 最大放电电流 1C 0°C~15°C and 45°C~60°C: Discharge Current Max. 0.5C 最大放电电流 0.5C	



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Attachment 2 Photos



--- The End of Test Report ---



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